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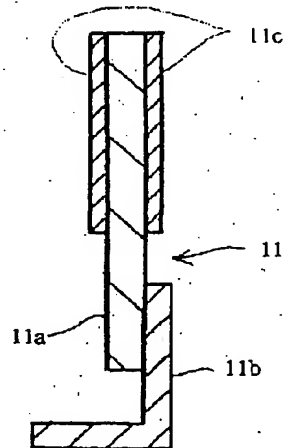
(54) **TRANSFER BLADE**

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a transfer blade which has a coating layer, is free of an image defect and the wear of a blade edge and makes the coating layer hardly peelable.

SOLUTION: The coating layer is formed in at least the contact part of a blade body of the transfer blade with a mating member by using a composition of a fluororesin or silicone base resin, more preferably a compound of a fluorinated olefin resin, fluorine denatured acrylate resin and acrylate which is crosslinked by an isocyanate crosslinking agent.

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* NOTICES *

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2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The imprint blade characterized by forming the coating layer which is the imprint blade used in an electrophotography process in order to make record material imprint the toner image on a photo conductor, and comes at least to use the constituent in the aforementioned imprint blade which contains a fluorine system resin, a silicon system resin, or these in the contact section with a partner member.

[Claim 2] The imprint blade according to claim 1 to which the aforementioned coating layer is characterized by using the constituent containing a fluorination olefine resin or this.

[Claim 3] The imprint blade according to claim 2 to which the aforementioned coating layer is characterized by using the constituent containing the compound of a fluorination olefine resin, a fluorine denaturation acrylate system resin, and an acrylate system resin, or this.

[Claim 4] The imprint blade according to claim 3 to which the aforementioned coating layer is characterized by a bridge being constructed by the isocyanate system cross linking agent, using the constituent containing the compound of a fluorination olefine resin, a fluorine denaturation acrylate system resin, and an acrylate system resin, or this.

[Claim 5] The imprint blade according to claim 1 to 4 to which the volume resistivity of the aforementioned coating layer is characterized by being 1×10^{10} or more ohm-cm.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention is an imprint blade used as an imprint means of a toner image in the electrophotography process using the photoconduction phenomenon, and relates to the thing in the blade main part made of rubber which formed the coating layer in the contact section and its near section with a partner member at least.

[0002]

[Description of the Prior Art] As everyone knows, the electrophotography process of continuous system is performed like drawing 1 in the thing using for example, the belt for an imprint of a type.

[0003] That is, the electrostatic latent image of a picture is formed by electrifying the front face of the rotating-drum-like photo conductor 2 uniformly with the electrification vessel 1 first, putting light in a photographic filter 3 to portions other than the picture section of photo conductor 2 front face next, and removing a charge. The electrification toner of an electrostatic latent image and a reverse property adheres as the pattern of an electrostatic latent image, and constitutes a visible image (toner image) from the development section 4.

[0004] On the other hand, in the small lower part of a photo conductor 2, the record material (illustration ellipsis) by which the endless-like belt 5 for an imprint carried out circulation movement, and has been conveyed to proper timing in this belt 5 top can give the charge of a reverse property with the electrification polarity of a toner through the imprint means 6 contacted from the background of a belt 5. Therefore, the toner image constituted by the front face of a photo conductor 2 is imprinted by the front face of record material, such as the

conveyed recording paper, when a lower rotation position is arrived at. Then, it is fixed to a toner image by the fixing assembly 7, and photo conductor 2 front face after an imprint is returned to an initial state by operation of the electric discharge machine 8 and a cleaner 9, and 1 cycle of an electrophotography process is completed.

[0005] As a typical example of the above-mentioned imprint means 6 in this electrophotography process, as shown in drawing 2, the imprint blade 10 which supported blade main part 10a by base material 10b is used in the state of contacting like illustration, from the background of a belt 5. And the coating layer which constituted the above-mentioned blade main part 10a using rubber material, such as HIDORINGOMU, polyurethane rubber, and a nitrile rubber, or used resin material on this blade main part 10 made of rubber a was formed conventionally.

[0006]

[Problem(s) to be Solved by the Invention] However, the resin material with which the conventional blade is coated needed to secure flexibility and the adhesion force for peeling prevention with the blade main part made of rubber, and use of low friction material was difficult. For this reason, there were a trouble which needs the big force for the drive of a belt, and a trouble said that the amount of wear of an edge portion which touches the belt of an imprint blade if it pulls becomes large. Furthermore, generally the volume resistivity was as low as ohm [1×10^8 to 1×10^{10}], and cm grade, the electric discharge from coat layers other than the nose-of-cam cut side (rubber outcrop) of the required electric discharge section occurred, and aggravation of a picture was caused.

[0007] Then, this invention makes it the technical problem which should be solved to cancel these troubles in the conventional imprint blade.

[0008] An invention-in-this-application person is the process which applies a trial-and-error method to improvement in a volume resistivity, reduction of coefficient of friction, adhesion with the blade main part made of rubber, etc. using various material about a coating layer, and studied experimentally that it was very effective to form a coating layer using the constituent containing a fluorine system resin, a silicon system resin, or these.

[0009]

[Means for Solving the Problem] (Composition of the 1st invention) The composition of the 1st invention (invention according to claim 1) of this application for solving the above-mentioned technical problem it is the imprint blade used in order to make record material imprint the toner image on a photo conductor in an electrophotography process, and can set to the aforementioned imprint blade -- in the contact section with a partner member at least it is the imprint blade in which the coating layer which comes to use the constituent containing a fluorine system resin, a silicon system resin, or these is formed.

[0010] (Composition of the 2nd invention) The composition of the 2nd invention (invention according to claim 2) of this application for solving the above-mentioned technical problem is an imprint blade using the constituent with which the coating layer concerning the 1st invention of the above contains a fluorination olefine resin or this.

[0011] (Composition of the 3rd invention) The composition of the 3rd invention (invention according to claim 3) of this application for solving the above-mentioned technical problem is an imprint blade using the constituent with which the coating layer concerning the 2nd invention of the above contains the compound of a fluorination olefine resin, a fluorine denaturation acrylate system resin, and an acrylate system resin, or this.

[0012] (Composition of the 4th invention) The composition of the 4th invention (invention according to claim 4) of this application for solving the above-mentioned technical problem is an imprint blade over which a bridge is constructed by the isocyanate system cross linking agent, using the constituent with which the coating layer concerning the 3rd invention of the above contains the compound of a fluorine-ized olefine resin, a fluorine denaturation acrylate system resin, and an acrylate system resin, or this.

[0013] (Composition of the 5th invention) The composition of the 5th invention (invention according to claim 5) of this application for solving the above-mentioned technical problem is an imprint blade whose volume resistivity of the coating layer concerning the 1st invention of the above - the 4th invention is 1×10^{10} or more ohm-cm.

[0014]

[Function and Effect of the Invention] (An operation and effect of the 1st invention) As compared with the rubber material which constitutes the aforementioned conventional imprint blade main part, and the nylon system resin material used for coating layer formation, the material which consists of a constituent containing a fluorine system resin, a silicon system resin, or these has a remarkably high volume resistivity, and its coefficient of friction is small. [0015] since the coating layer which comes at least to use the constituent in an imprint blade which contains a fluorine system resin, a silicon system resin, or these in the contact section with a partner member forms in the 1st invention -- since coefficient of friction of a coating layer is small -- a partner -- the big force does not need for the drive of the belt for an imprint which is a member, or the drum for an imprint, as a result there is also no fault which says that the amount of the edge portion of an imprint

[0016] (An operation and effect of the 2nd invention) When using the constituent with which the coating layer of an imprint blade contains a fluorine-ized olefine resin or this like the 2nd invention, the 1st effect of the invention of the above is demonstrated especially good.

[0017] (an operation and the effect of the 3rd invention) the coating layer of an imprint blade - the material of the 1st invention or the 2nd invention -- with, it newly became clear to be accompanied by the inclination to become easy exfoliating at the time of cutting processing of an imprint blade while the above effects resulting from reduction of frictional resistance are securable what forms, as a result of the adhesion force with the blade main part which usually serves as a coating layer from the product made of rubber declining a little etc. As exaggeratingly shown in drawing 3, the ablation from blade main part 10a of such coating layer 10c has the concern referred to as barring the good contact of the imprint blade 10 to a belt 5 (or drum for an imprint).

[0018] However, it turns out that the adhesion force over the blade main part of a coating layer raises maintaining the 1st invention of the above, and the 2nd effect of the invention when the constituent which contains the compound or this which added a fluorine denaturation acrylate system resin and an acrylate system resin to a fluorine-ized olefine resin as a component of a coating layer like the 3rd invention is used, and both exfoliation in the time of cutting processing of an imprint blade etc. can prevent effectively.

[0019] (An operation and effect of the 4th invention) In the 4th invention, since a bridge is constructed over the above-mentioned coating layer by the isocyanate system cross linking agent, using the constituent containing the compound of a fluoridation olefine resin, a fluorine denaturation acrylate system resin, and an acrylate system resin, or this, the adhesion force over the blade main part of a coating layer improves further, and ablation of a coating layer cannot take place much more easily.

[0020] (An operation and effect of the 5th invention) Like the 5th invention, when the volume resistivity of a coating layer is 1×10^{10} or more ohm-cm, the fault with a poor picture based on shortage of the volume resistivity in the aforementioned conventional technology can be prevented especially good. In addition, it is also possible it to raise a volume resistivity further by changing change of a fluorine-ized olefin polymer kind and the mixing ratio of various fluorine-ized olefin polymer about such material, although the component of the coating layer concerning the 1st invention of the above - the 4th invention generally shows the volume resistivity of 1×10^{10} or more ohm-cm.

[0021]

[Embodiments of the Invention] Next, the form of implementation of the 1st invention - the 5th invention is explained. When only telling a "this invention" to below, the 1st invention - the 5th invention are pointed out collectively.

[0022] [Imprint blade] The imprint blade concerning this invention does not have limitation, as long as it is the blade used in order to imprint the electric conduction blade for an imprint, i.e., the toner image formed on the photo conductor in the electrophotography process, to record material.

[0023] Although there is no limitation special about a configuration, or the composition and the use form of an imprint blade, the typical example of composition is shown in drawing 4 as a side cross section. That is, the imprint blade 11 consists of blade main part 11a and base material 11b, and coating layer 11c which consists of a predetermined material is formed in the predetermined portion of blade main part 11a.

[0024] [Blade main part] Although the component of a blade main part is not limited as long as the required function and elasticity, or flexibility as an imprint blade is shown, it is a product made of rubber typically, and rubber material, such as HIDORINGOMU, polyurethane rubber, and a nitrile rubber, is used especially preferably. Although a blade main part is shown as a side cross section in drawing 4; in the usual case, a blade main part has the cross-section configuration to illustrate, and is formed in the depth direction as a slender plate. What is necessary is not to limit size items, such as the length of the thickness of a blade main part, lengthwise [of drawing], and the depth direction, at all, but just to set them up arbitrarily if needed. The edge of one side of the upper-limit section in drawing 4 is the contact section with a partner member (an imprint belt and imprint drum).

[0025] You may form in a part for the point of an imprint blade the taper sides including a below-mentioned blade main part and a below-mentioned coating layer where the single-sided field (field of the side containing the edge in contact with a partner member) of a blade was omitted aslant.

[0026] [Coating layer] A coating layer is a thing in an imprint blade (or the blade main part) preferably formed in the contact section with a partner member at least at this contact section and its near section. In the usual case, it inclines to some extent in one side, and an imprint blade is contacted, so that those cross direction (the depth direction of each drawing) may be crossed to the belt for an imprint, or the drum for an imprint, and as shown in drawing 2 or drawing 3.

[0027] the front face on which the edge section of aforementioned one side in a blade main part belongs that the coating layer should just be formed [therefore] in the contact section, or this contact section and its near section with such [at least] a partner member -- and it is sufficient if formed only in a part for the nose-of-cam flank near the edge section. However, it does not specially matter even if the coating layer is formed also in the other portion in a blade main part. For example, when carrying out dipping of the blade main part to coating liquid and forming a coating layer, a coating layer is inevitably formed in the both-sides side of a blade main part. Although coating layer thickness can be set up arbitrarily if needed, it can be set as about 5-30 micrometers, for example.

[0028] [A fluorine system resin and silicon system resin] The component of the coating layer in this invention is a constituent containing a fluorine system resin, a silicon system resin, or these. a "constituent" makes a principal component a fluorine system resin and a silicon system resin, and means the constituent which comes out unless an operation and effect of this invention are checked, and contains other arbitrary components here. As arbitrary components" besides " said here, an epoxy resin, acrylic resin, polyester resin, etc. can be illustrated preferably.

[0029] The isocyanate system cross linking agent was further blended to the constituent containing the constituent containing the thing or these with which the fluorine denaturation acrylate system resin and the acrylate system resin were blended to the constituent with which especially a desirable thing contains a fluoridation olefine resin or this as a fluorine system resin or a constituent containing this, and the fluoridation olefine resin, the compound of a fluoridation olefine resin, a fluorine denaturation acrylate system resin, and an acrylate system resin, or these, and bridge formation was made.

[0030] Among these, although the technical meaning using a fluoridation olefine resin is as aforementioned, adhesion with base-material rubber can be further raised by blending a fluorine denaturation acrylate system resin and an acrylate system resin to this fluoridation olefine resin. Moreover, it is desirable at the point said that the adhesion force to the blade main part of a coating layer can be raised further, and it can make OH basis of an acrylate system resin construct a bridge effectively as a bridge formation seat especially by adding an isocyanate system cross linking agent.

[0031] Although the kind of the above-mentioned silicon system resin is not limited to special, silicon denaturation polyester resin, silicon denaturation acrylic resin, etc. can be used preferably, for example.

[0032] [Fluorine-ized olefine resin] A polymerization or although it carries out copolymerization and is obtained, a fluorine-ized olefine resin fluorine-ized olefin monomers, such as tetrafluoroethylene, fluoride vinylidene, hexafluoropropylene, vinyl ether, etc. fluoride

For example A polyvinylidene-fluoride and fluoride vinylidene-tetrafluoroethylene copolymer, a fluoride vinylidene-tetrafluoroethylene-hexafluoropropylene copolymer, a tetrafluoroethylene-hexafluoropropylene copolymer, A fluoride vinylidene-hexafluoropropylene copolymer etc. can be used preferably.

[0033] [Fluorine denaturation acrylate system resin] As a fluorine denaturation acrylate system resin, it is an acrylic resin and the polymer which is made to carry out the polymerization of the fluoridation acrylate or fluoridation methacrylate which consists of ester of the structure with which perfluoroalkyl ester or a partial fluoridation alkyl group of an acrylic acid or a methacrylic acid etc. was made to connect with an organic connection machine etc., and the acrylate or methacrylate by which fluorine denaturation is not carried out, and is obtained can be used preferably, for example.

[0034] [Acrylate system resin] As an acrylate system resin, it is the usual homopolymer or usual copolymers of an acrylate system monomer, such as hydroxyalkyl ester, such as alkyl ester, such as a methyl about an acrylic acid or a methacrylic acid, ethyl, butyl, an octyl, and a dodecyl, hydroxyethyl, and hydroxy butyl, and glycidyl ester, and especially the homopolymer or copolymer of methyl methacrylate is used preferably, for example.

[0035] As for the above-mentioned acrylate system resin, it is desirable to have two or more OH bases into the molecule by the relation with cross-linking-agent addition. For that purpose, OH basis can be made to generate, after using the hydroxyalkyl ester of an acrylic acid or a methacrylic acid as a monomer, making the compound which has OH basis react to the reactant machine in a polymer chain or, carrying out the polymerization of the generable monomer (or OH basis was made to block) for OH basis for example, (or a block release).

[0036] [Cross linking agent] An isocyanate system cross linking agent, especially the poly isocyanate compound of two or more organic functions are especially desirable, and a cross linking agent is used. for example, it is independent about 2 and 4- and 2, 6-tolylene diisocyanate, ortho toluidine diisocyanate, naphthylene diisocyanate, xylylene diisocyanate, 4, and 4'-diphenylmethane diisocyanate, its carbon diimide denaturation object, the trimethylol-propane adduct object of hexamethylene di-isocyanate, a polymethylene polyphenyl isocyanate, a polymeric poly isocyanate, etc. -- it is -- it can use preferably under combined use

[0037]

[Example] (Production of an imprint blade) It was the imprint blade (imprint blade which does not have a coating layer) of the conventional composition shown in aforementioned drawing 2, and the blade main part consisted of HIDORINGOMU, that whose thickness of a cross section is 2 micrometers was produced according to the conventional method, and this was made into the example 1 of comparison.

[0038] Next, to the same blade main part as the above-mentioned example 1 of comparison, using the coating liquid of N-methoxymethyl-ized nylon which is nylon system resin material, dipping was performed, and cutting required after solidification of coating liquid was added, the imprint blade formed in the state which shows the coating layer whose thickness is about 15 micrometers in aforementioned drawing 4 was produced, and this was made into the example 2 of comparison.

[0039] On the other hand, the imprint blade in which the coating layer of the fluoride vinylidene-ethylene tetrafluoride which is a fluoridation olefine resin was formed was produced like the example 2 of comparison as an example 1.

[0040] It is made to be the same as that of the example 2 of comparison as an example 2. Moreover, a fluoridation olefine resin (specifically fluoride vinylidene-ethylene tetrafluoride), A fluorine denaturation acrylate system resin (copolymer which specifically makes a principal component the partial fluoridation alkyl ester and methyl methacrylate of an acrylic acid), The imprint blade in which the coating layer which consists of a compound of the weight section ratio 80:10:10 with an acrylate system resin (methyl methacrylate system resin to which copolymerization of the hydroxyethyl methacrylate was specifically carried out) was formed was produced.

[0041] Furthermore, the imprint blade in which the coating layer which consists of material over which carried out 1.5phr combination and the poly isocyanate cross linking agent (specifically trimethylol-propane adduct object of hexamethylene di-isocyanate) was made to

construct a bridge to the same compound as an example 2 was formed was produced like the example 2 of comparison as an example 3.

[0042] (The physical properties of an imprint blade, and evaluation) About the imprint blade of the example 2 of comparison, and examples 1-3, the volume resistivity (ohm-cm) of the coating layer was measured. Although the result is shown in Table 1 of a tail, it turns out to the example of comparison that the volume resistivity of each example is high.

[0043] Next, although the 10x10x2mm sample fragment 12 was cut out from a part for about 2mm blade book soma in those thickness and the laminating of the sheet 14 of PET (polyethylene terephthalate) was carried out on the suitable base material 13 about the imprint blade of each aforementioned example, it laid in the free state upwards. And the base material 13 was leaned gradually and the angle (theta) at which the sample fragment 12 starts slipping down from on a sheet 14 was measured. Although the result is shown in Table 1 of a tail, the example 1 of comparison has a very large angle theta, and although the example 2 of comparison has a little small angle theta, it becomes and is [examples 1-3] large. It is thought that the size of this angle theta corresponds to the size of coefficient of friction of the sample fragment 12 (namely, blade main part).

[0044] Moreover, visual observation of the existence (adhesion force of a coating layer) of exfoliation between the blade main parts and coating layers at the time of cutting processing with the cutting edge after coating layer formation in the above-mentioned imprint blade production process was carried out about the imprint blade of examples 1-3. In addition, each example was followed in the processing method (the A method) which the exfoliation called cutting-speed 0.5mm/sec. cannot produce easily as cutting processing, and the processing method (the B method) which the exfoliation called cutting-speed 2mm/sec. tends to produce. About the examples 1 and 2 of comparison, it did not evaluate as outside of an object.

[0045] Although it was shown in Table 1, having used as O the example which did not produce ablation for the example which produced ablation for the example which produced ablation for the result of the above-mentioned evaluation also in any of the A method and the B method only in the case of x and the B method in any of **, the A method, and the B method, it turns out that the adhesion force of a coating layer is high in the order of the example 1 -> example 2 -> example 3.

[0046]

Table 1]

	比較例 1	比較例 2	実施例 1	実施例 2	実施例 3
体積抵抗率 ($\Omega \cdot \text{cm}$)	—	1.2×10^9	2.2×10^{10}	2.3×10^{10}	2.4×10^{10}
滑落開始角度 (θ)	31°	21°	12°	13°	13°
密着力	—	—	×	△	○

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing an example of an electrophotography process notionally.

[Drawing 2] It is drawing showing the busy condition with the conventional imprint blade.

[Drawing 3] It is drawing showing the desquamative state of a coating layer.

[Drawing 4] It is drawing showing the composition of the imprint blade which has a coating layer.

[Drawing 5] It is drawing showing the test method of the frictional resistance of an imprint blade.

[Description of Notations]

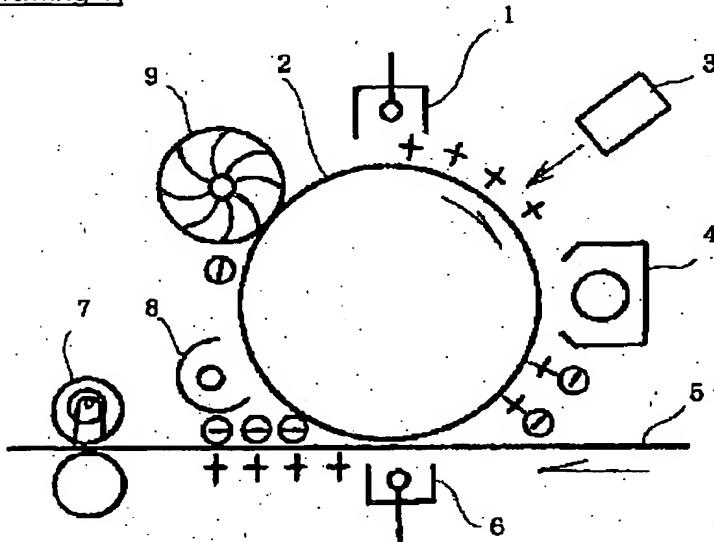
5 Belt for Imprint

10 11 Imprint blade

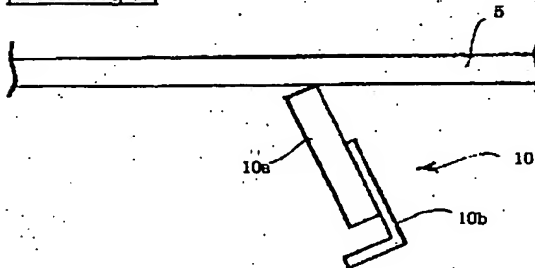
11a Blade main part
11c Coating layer

DRAWINGS

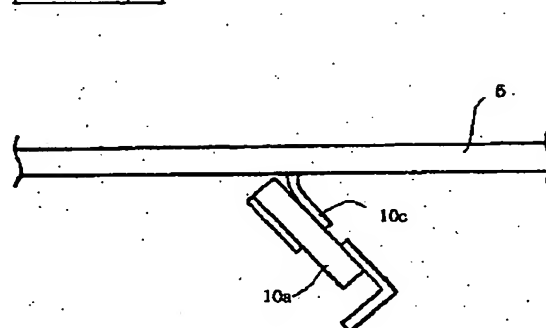
[Drawing 1]



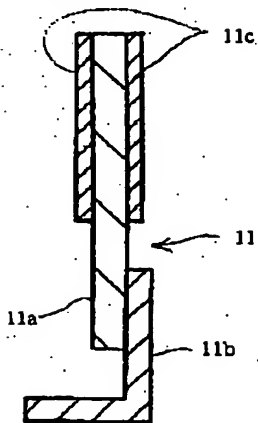
[Drawing 2]



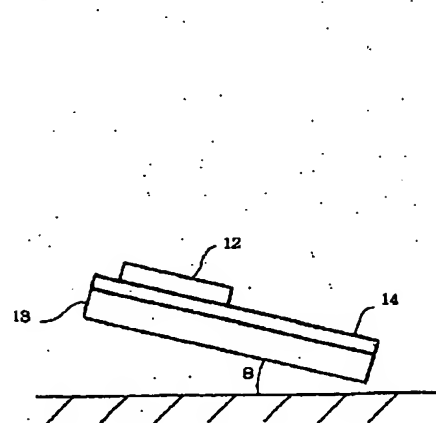
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]

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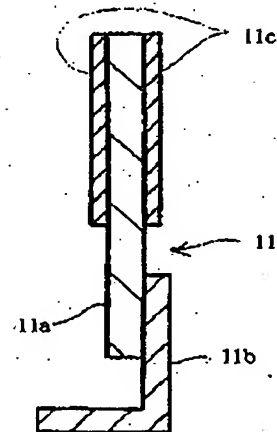
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(54) 【発明の名称】 転写ブレード

(57) 【要約】

【課題】 コーティング層を備えた転写ブレードであって、画像不良やブレードエッジの磨耗がなく、コーティング層の剥離し難いものを提供する。

【解決手段】 転写ブレードのブレード本体における少なくとも相手部材との接触部に、フッ素系樹脂又はシリコン系樹脂の組成物、好ましくはフッ化オレフィン樹脂、フッ素変性アクリレート樹脂及びアクリレート樹脂の配合物であってイソシアネート架橋剤により架橋したものをを用いて、コーティング層を形成する。



ート系樹脂の配合物あるいはこれを含む組成物を用いたものである、転写ブレードである。

【0012】（第4発明の構成）上記課題を解決するための本願第4発明（請求項4に記載の発明）の構成は、前記第3発明に係るコーティング層が、フッ素化オレフィン樹脂、フッ素変性アクリレート系樹脂及びアクリレート系樹脂の配合物あるいはこれを含む組成物を用い、かつ、イソシアネート系架橋剤によって架橋されたものである、転写ブレードである。

【0013】（第5発明の構成）上記課題を解決するための本願第5発明（請求項5に記載の発明）の構成は、前記第1発明〜第4発明に係るコーティング層の体積抵抗率が、 $1 \times 10^{10} \Omega \cdot \text{cm}$ 以上である、転写ブレードである。

【0014】

【発明の作用・効果】（第1発明の作用・効果）フッ素系樹脂、シリコン系樹脂あるいはこれらを含む組成物からなる材料は、前記従来の転写ブレード本体を構成するゴム材料や、コーティング層形成に用いられるナイロン系樹脂材料に比較して、著しく体積抵抗率が高く、かつ摩擦係数が小さい。

【0015】第1発明においては、転写ブレードにおける少なくとも相手部材との接触部に、フッ素系樹脂、シリコン系樹脂あるいはこれらを含む組成物を用いてなるコーティング層を形成しているため、コーティング層の摩擦係数が小さいため相手部材である転写用ベルトや転写用ドラムの駆動に大きな力を必要としないし、ひいては転写ブレードのエッジ部分の磨耗量が大きくなると言う不具合もない。

【0016】（第2発明の作用・効果）第2発明のように、転写ブレードのコーティング層がフッ素化オレフィン樹脂あるいはこれを含む組成物を用いたものである場合に、上記第1発明の効果が特に良好に発現される。

【0017】（第3発明の作用・効果）転写ブレードのコーティング層を第1発明又は第2発明の材料を以て形成することにより、磨損抵抗の低減に起因する上記のような効果を確保できる一方で、コーティング層と通常はゴム製からなるブレード本体との密着力がやや低下する結果、例えば転写ブレードの切断加工時等に剥離し易くなる傾向を伴うことが新たに判明した。図3に誇張して示すように、このようなコーティング層10cのブレード本体10aからの剥離は、ベルト5（あるいは転写用ドラム）に対する転写ブレード10の良好な接触を妨げると言う懸念がある。

【0018】しかしながら第3発明のように、コーティング層の構成材料として、フッ素化オレフィン樹脂に対してフッ素変性アクリレート系樹脂及びアクリレート系樹脂を加えた配合物あるいはこれを含む組成物を用いた場合には、上記第1発明、第2発明の効果を維持しつつコーティング層のブレード本体に対する密着力を向上さ

せ、転写ブレードの切断加工時等における両者の剥離を有効に防止できることが分かった。

【0019】（第4発明の作用・効果）第4発明においては、上記コーティング層が、フッ素化オレフィン樹脂、フッ素変性アクリレート系樹脂及びアクリレート系樹脂の配合物あるいはこれを含む組成物を用い、かつ、イソシアネート系架橋剤によって架橋されたものであるため、コーティング層のブレード本体に対する密着力が更に向上し、コーティング層の剥離が一層起こり難い。

【0020】（第5発明の作用・効果）第5発明のように、コーティング層の体積抵抗率が $1 \times 10^{10} \Omega \cdot \text{cm}$ 以上であることにより、前記従来技術における体積抵抗率の不足に基づく画像不良の不具合を特に良好に防止することができ、なお、上記第1発明〜第4発明に係るコーティング層の構成材料は、一般的に $1 \times 10^{10} \Omega \cdot \text{cm}$ 以上の体積抵抗率を示すが、これらの材料についてフッ素化オレフィンポリマー樹脂の変更や各種フッ素化オレフィンポリマーの混合比の変更を行うことにより、更に体積抵抗率を向上させることも可能である。

【0021】

【発明の発施の形態】次に、第1発明〜第5発明の発施の形態について説明する。以下において単に「本発明」と言うときは、第1発明〜第5発明を一括して指している。

【0022】【転写ブレード】本発明に係る転写ブレードは、転写用導電ブレード、即ち、電子写真プロセスにおいて感光体上に形成されたトナー像を記録材に転写するために用いるブレードである限りにおいて限定がない。

【0023】転写ブレードの形状や構成及び使用形態については別段の限定がないが、代表的な構成例を図4に側面断面図として示す。即ち、転写ブレード11はブレード本体11aと支持体11bとからなり、ブレード本体11aの所定部分には所定の材料からなるコーティング層11cが形成されている。

【0024】【ブレード本体】ブレード本体の構成材料は、転写ブレードとしての必要な機能及び弾性もしくは柔軟性を示す限りにおいて限定されないが、代表的にはゴム製であり、特にヒドリンゴム、ウレタンゴム、ニトリルゴム等のゴム材料が好ましく用いられる。図4においてはブレード本体を側断面として示すが、通常の場合、ブレード本体は図示する断面形状をもち、かつ奥行き方向に長い板状体として形成される。ブレード本体の厚さ、図の縦方向及び奥行き方向の長さ等の寸法諸元は何ら限定されず、必要に応じて任意に設定すれば良い。図4における上端部の片側のエッジが相手部材（転写ベルトや転写ドラム）との接触部である。

【0025】転写ブレードの先端部分には、後述のブレード本体及びコーティング層を含めて、ブレードの片側面（相手部材と接触するエッジを含む側の面）が斜めに

【0037】

【実施例】（転写ブレードの作製）前記図2に示した従来の構成の転写ブレード（コーティング層を有しない転写ブレード）であって、ブレード本体がヒドリゴムからなり、断面の厚さが2 μ mであるものを、常法に従って作製し、これを比較例1とした。

【0038】次に、上記比較例1と同一のブレード本体に対し、ナイロン系樹脂材料であるN-メトキシメチル化ナイロンのコーティング液を用いてディッピングを行い、かつコーティング液の固化後に必要な切断を加えて、厚さが約1.5 μ mのコーティング層を前記図4に示す状態で形成した転写ブレードを作製し、これを比較例2とした。

【0039】一方、実施例1として、比較例2と同様に、フッ素化オレフィン樹脂であるフッ化ビニリデン-4フッ化エチレンのコーティング層を形成した転写ブレードを作製した。

【0040】又、実施例2として、比較例2と同様に、フッ素化オレフィン樹脂（具体的にはフッ化ビニリデン-4フッ化エチレン）と、フッ素変性アクリレート系樹脂（具体的にはアクリル酸の部分フッ素化アルキルエステルとメチルメタクリレートとを主成分とする共重合体）と、アクリレート系樹脂（具体的にはヒドロキシエチルメタクリレートと共重合させたメチルメタクリレート系樹脂）との重量比率80:10:10の配合物からなるコーティング層を形成した転写ブレードを作製した。

【0041】更に、実施例3として、比較例2と同様に、実施例2と同じ配合物に対してポリイソシアネート架橋剤（具体的にはヘキサメチレンジイソシアネートのトリメチロールプロパンアダクト体）を1.5phr配合して架橋させた材料からなるコーティング層を形成した転写ブレードを作製した。

【0042】（転写ブレードの物性及び評価）比較例2*

	比較例1	比較例2	実施例1	実施例2	実施例3
体積抵抗率 ($\Omega \cdot \text{cm}$)	-	12×10^9	2.2×10^{10}	2.3×10^{10}	2.4×10^{10}
滑走開始角度 (θ)	31°	21°	12°	13°	13°
密着力	-	-	x	Δ	○

【図面の簡単な説明】

【図1】電子写真プロセスの一例を概念的に示す図である。

【図2】従来の転写ブレードと、その使用状態を示す図である。

【図3】コーティング層の剥離状態を示す図である。

【図4】コーティング層を有する転写ブレードの構成を示す図である。

*及び実施例1～3の転写ブレードについて、そのコーティング層の体積抵抗率($\Omega \cdot \text{cm}$)を測定した。その結果を末尾の表1に示すが、比較例に対して各実施例の体積抵抗率が高いことが分かる。

【0043】次に、前記各例の転写ブレードについて、それらの厚さ約2mmブレード本体部分から10 \times 10 \times 2mmの試料断片12を切り取り、適当な基材13上にPET（ポリエチレンテレフタレート）のシート14を積層させたものの上に自由状態で載置した。そして基材13を次第に傾け、試料断片12がシート14上から滑落を開始する角度(θ)を測定した。その結果を末尾の表1に示すが、比較例1は角度 θ が非常に大きく、比較例2は角度 θ がやや小さいが実施例1～3に比べるとかなり大きい。この角度 θ の大小は、試料断片12（即ち、ブレード本体）の摩擦係数の大きさに対応しているものと考えられる。

【0044】又、実施例1～3の転写ブレードについて、上記転写ブレード作製過程における、コーティング層形成後の切断刃による切断加工時の、ブレード本体とコーティング層との間の剥離の有無（コーティング層の密着力）を目視観察した。なお、切断加工としては、切断速度0.5mm/sec.と云う剥離の生じ難い加工法（A法）と、切断速度2mm/sec.と云う剥離の生じ易い加工法（B法）とを各例について行った。比較例1、2については、対象外として評価しなかった。

【0045】上記評価の結果を、A法、B法のいずれにおいても剥離を生じた例をx、B法の場合にのみ剥離を生じた例を Δ 、A法、B法のいずれにおいても剥離を生じなかった例を○として表1に示したが、実施例1～実施例3の順でコーティング層の密着力が高くなっていることが分かった。

【0046】

【表1】

【図5】転写ブレードの摩擦抵抗の試験方法を示す図である。

【符号の説明】

5 転写用ベルト
10、11 転写ブレード
11a ブレード本体
11c コーティング層